**PROJECT NUMBER:** 1720
**PROJECT TITLE:** Analytical Microscopy
**PROJECT LEADER:** V. L. Baliga
**PERIOD COVERED:** November, 1989

## I. REDUCED SIDESTREAM/PAPER TECHNOLOGY (YI, SANDERS)

**A. Objective**: Examine the ultrastructure of selected cigarette papers and paper additives in support of the low sidestream project.

**B. Results**:

Five paper, char, and ash samples from $45g/M^2$ basis weight papers were examined and compared. Each paper contained a different K containing fluxing agent. The ash from papers with $KH_2PO_4$, $K_2HPO_4$, and $K_3PO_4$ (2.9% K) remained intact unlike the $18g/M^2$ basis weight papers. The lighter weight papers with the same additives disintegrated after they were burned[1]. The ash from the heavier weight papers with the three fluxing agents mentioned above as well as papers with KCl or $K_2$ acetate fluxing agents, formed ash that were light to dark gray in color. With additional burning or with increased temperatures, however, the ash turned white in color. Paper with KCl burned faster than the four other papers. The ash and char from all five papers exhibited a glazing effect and/or fused crystals[2].

Two papers were examined that were coated with precipitated sol gel produced at Lee Labs. The sol gel was divided into two batches and washed to remove chloride ions, one by centrifugation, the other by membrane filtration. One paper was coated with the centrifuged washed sol gel and the other paper was coated with the membrane washed sol gel. The two washing procedures made no difference in the way the sol gels coated the flax fibers of the cigarette papers[3].

Two hydromagnesite samples ($Mg(CO_3)_4 \cdot 4\text{-}5H_2O$) were examined. One sample was prepared using $Mg(NO_3)_2$ while the other was prepared using Mg acetate. Both samples consisted of aggregates of thin platelets with curled edges[4].

Paper, ash, and char from two Japanese-made cigarettes were examined. Both the Mild Seven and the Marlboro cigarette papers contained Ti along with Ca. The Mild Seven ash maintained its paper shape and exhibited a smooth glazed surface with interconnected particles. The Marlboro from Japan burned similarly to the U.S. Marlboro. Its ash was fluffy and fell apart after being burned[5].

**C. References**:


1. Yi, G., "Structural Characterization of Two Inner Wraps Containing $K_2HPO_4$ and $K_3PO_4$," Memo to S. Tafur, September 28, 1989.
2. Yi, G., "Morphological Characterizations and Comparisons of Experimental Cigarette Papers," Memo to S. Baldwin, October 30, 1989.




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3. Sanders, K., "Examination of Papers XHIL-4 and XHGA-3," Memo to B. Edwards, October 30, 1989.
4. Yi, G., "Structural Comparisons of Two Hydromagnesites," Memo to J. Fournier, October 29, 1989.
5. Yi, G., "Structural Analysis and Elemental Contents of Mild Seven Lights and Marlboro King Produced in Japan," November 4, 1989.

## II. SUPPORT TO OPERATIONS (SANDERS)

A. **Objective**: Provide analytical support to R&D.

B. **Results**: Two Gelman TPM pads were examined for structural differences but were found to be the same[1].

C. **References**:

Sanders, K., "Analytical Microscopy Result Form," to J. Lewis, October 23, 1989.

## III. MISCELLANEOUS (BALIGA, SANDERS)

A Malvern particle size analyser was ordered and received. It can measure and plot the size distribution of particles in solution from 0.1µm to 500µm in diameter. This will be used to measure the size distribution of production batches of precipitated sol gels.

The article, "Children of Alcoholics," by Karen Sanders, published in the November 1988 issue of the Virginia Lifeline journal, was awarded 2nd place Feature Article by the Virginia Publishers wing at the State of Virginia VAVRS convention.

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